CLAIMS

Having thus described the preferred embodiment, the invention is now claimed to be:

1. A cooling device **(70, 70', 70'')** for an associated x-ray tube **(26)** comprising:

a fluid inlet **(72, 72', 72'')** which receives a supply of cooling fluid from an associated source **(52)**;

a hollow cover member **(110, 110', 110'')** in fluid communication with the inlet, the cover member:

including a wall **(118, 118', 118'')** which defines an aperture **(126, 126', 126'')** sized for receiving a portion **(34)** of the associated x-ray tube therethrough,

defining, at least in part, an interior annular flow path **(152, 152', 152'')** for cooling fluid to circulate around the portion **(34)** of the associated x-ray tube, and

providing at least one fluid outlet **(140, 140'', 156, 156')** through which cooling fluid exits the cover member at a plurality of locations around the portion of the associated x-ray tube.

2. The cooling device according to claim 1, wherein the flow path has a first end **(150, 150')** communicating with the fluid inlet and a second end **(154, 154')** located adjacent to the first end, such that the cooling fluid maintains a generally unidirectional flow.

3. The cooling device according to claim 2, wherein a baffle **(144, 144')** spaces the first end of the flow path from the second end of the flow path.

4. The cooling device according to claim 3, wherein the baffle **(144, 144')** is angled generally tangentially to a periphery of the portion **(34)** of the associated x-ray tube.

5. The cooling device according to claim 1, wherein the wall **(118, 118', 118'')** defines a plurality of angularly spaced notches **(140, 140'')** which extend radially outward from the aperture **(126, 126'')** through which cooling fluid exits the cover member **(70, 70'')**.

6. The cooling device according to claim 5, wherein the notches **(140, 140'')** have an angular spacing which decreases along the fluid flow path **(152)**.

7. The cooling device according to claim 5, wherein the notches **(140, 140'')** are more closely spaced at an end **(154)** of the fluid flow path furthest from the inlet than at an end **(150)** of the fluid flow path closest to the inlet **(72, 72'')**.

8. The cooling device according to claim 5, wherein there are at least eight notches.

9. The cooling device according to claim 1, wherein the aperture **(126, 126', 126'')** is shaped to provide a gap **(156, 156'')** between the portion **(34)** of the X ray tube and the wall **(118, 118', 118'')** of the cover member.

10. The cooling device according to claim 9, wherein the gap **(156')** increases in width between a first end **(150')** of the flow path, adjacent the inlet tube, and a second end **(154')** of the flow path.

11. The cooling device according to claim 1, further including:

a fluid outlet **(170)**, positioned between the fluid inlet **(72'')** and the interior annular flow path **(152'')** for directing a portion of the cooling fluid to contact another portion of the x-ray tube.

12. The cooling device according to claim 1, further including at least one mounting bracket **(90, 90', 90'', 92, 92', 92'')** for mounting the cooling device to a surface **(32)** of the associated x-ray tube.

13. The cooling device according to claim 1, wherein the cover member **(110, 110', 110'')** defines a step **(24)** spaced from the wall which is shaped to support an electromagnetic coil **(40)** of the associated x-ray tube.

14. The cooling device according to claim 1, wherein the cover member **(110, 110', 110'')** defines an opening **(160)** at an opposite end from the aperture for cooling fluid to contact an associated surface **(32)** of the x-ray tube adjacent the portion **(34)**.

15. An x-ray tube assembly **(1)** comprising an x-ray tube **(26)** and the cooling device **(70, 70', 70'')** according to **claim 1**.

16. The x-ray tube assembly according to claim 15 wherein:

the portion includes a neck **(34)** of a cathode housing **(30)** of the x-ray tube **(26)**;

the cooling device is mounted to a plate **(32)** which is joined to the cathode housing neck, the plate forming a wall of an envelope **(14)** which defines an evacuated chamber **(12)** of the x-ray tube **(26)**; and

an anode **(10)** mounted within the evacuated chamber for rotation about an axis of rotation.

17. An x-ray tube assembly comprising:

a cathode housing **(30)** which supports a source of electrons **(20)**, the cathode housing defining a neck **(34)**;

a frame **(14)** defining an evacuated chamber **(12)**, the frame being connected with the cathode housing neck;

an anode **(10)** positioned within the evacuated chamber to be struck by the electrons and generate x-rays; and

a cooling device **(70, 70', 70'')** according to **claim 1** surrounding the neck of the cathode housing, the aperture **(126, 126', 126'')** being sized for receiving the neck of the cathode housing therethrough, the interior annular flow path **(152, 152')** defined within the cover member circulating cooling fluid around the cathode housing neck, the aperture of the cover member providing at least one fluid outlet **(140, 140'', 156, 156')** through which cooling fluid exits the cover member at a plurality of locations around the neck of the cathode housing.

18. The assembly of claim 17, wherein substantially all of the cooling fluid which enters the fluid flow path **(152, 152')** exits the cooling device through the aperture.

19. The assembly of claim 17, wherein the cooling device includes a base plate **(86, 86', 86'')**, connected with the cover member at an opposite end to the aperture **(126, 126', 126'')**, the base plate being mounted to the frame **(14)**.

20. A method of cooling a neck **(34)** of an x-ray tube assembly **(1)** comprising:

mounting a cooling device **(70, 70', 70'')** according to claim 1 around the neck;

supplying a cooling fluid to the cooling device, the cooling fluid flowing around the neck in an annular fluid flow path **(152, 152'')** defined, at least in part, by the cooling device; and

flowing the cooling fluid from the cooling device at a plurality of locations around the neck.

21. The method according to claim 20, further including:

directing the flow of cooling fluid such that the fluid flow in the flow path is unidirectional.

22. The method according to claim 20, wherein a volume of the flow of cooling fluid from the cooling device is substantially the same at an inlet end **(150, 150')** of the annular fluid flow path as at a terminal end **(154, 154')** of the annular flow path.